RESPONSE TO REJECTION UNDER 35 USC §102

The Examiner rejected claims 15, 17-20, 30-32, 36-38, 43 and 45-47 under 35 USC §102(b) as being anticipated by United States Patent No. 5,778,092 ("Macleod et al."). The Examiner stated that Macleod discloses "selecting pixels of the image to be reconstructed from plural planes of data representing the image, wherein said step of selecting comprises selecting pixels of the image from one of a single plane" in Fig. 25a, col. 14 lines 53-62, and "and an arithmetic operation of pixels from more than one of said plural planes" in Fig. 25b, col. 15 lines 1-18. Applicants respectfully traverse the rejection under §102(b).

The Prior Art

MacLeod et al. discloses a "technique for compressing scanned representations of color or gray scale documents." (Col. 3, lines 48-49). In particular, MacLeod et al. discloses "the pixel map representing a color or gray-scale document is decomposed into a three plane page format... comprised of a 'foreground' plane, a 'background' plane, and a 'selector' plane." (Col. 4, lines 11-15). The foreground and background plane each contain image information, "stored at the same bit depth and number of colors as the original raw pixel map." (Col. 4, lines 16-17). The selector plane, in contrast, is stored as a bitmap, a binary pixel map in which pixels can take one of two values, 1 or 0. (Col. 4, lines 18-19 and lines 8-10).

According to MacLeod et al., "the purpose of the selector plane is to describe, for each pixel in the selector plane, whether to use the pixel value found in the background plane or the foreground plane." (Col. 4, lines 44-47). In this embodiment, MacLeod et al. uses "the selector plane to switch between the foreground and background images." (Col. 14, lines 61-63). During decompression, "the decompressed

image is then created using the contents of the selector plane to determine the ultimate pixel value between corresponding pixels in the foreground plane and the background plane." (Col. 14, lines 53-57). For each pixel in the decompressed image, "a 'white' pixel in the selector plane (i.e. a logical zero value) means the pixel value should be taken from the corresponding pixel from the background plane." (Col. 4, lines 47-50). Conversely, "a 'black' pixel in the selector plane (i.e. a logical one value) means that the pixel value should be taken from the corresponding pixel from the foreground plane."

Thus, in MacLeod et al., the selector plane is used to choose between a pixel in the foreground plane or a pixel in the background plane. The choice between a foreground pixel and a background pixels is exclusive. The selector plane is used to decompress an entire image by choosing a foreground pixel or a background pixel, but not both. This embodiment of MacLeod et al. does not disclose performing any sort of arithmetic operation of pixels from more than one plane.

An alternate embodiment of MacLeod et al. creates a decompressed "output at a lower resolution when the document image is displayed on a computer based display system." (Col. 14, lines 66-67). (emphasis added). This alternate embodiment is used because it was determined that at low resolutions, the MacLeod method discussed above can result in aliasing artifacts (Col. 14, lines 64-65). In this alternate embodiment for low resolution, a gray-value pixel map is created from the selector plane. (Fig. 25b, step 2510). The binary-valued selector plane is reduced in resolution to form a gray-scale value pixel map. The gray-scale value of each gray-value pixel is determined by computing the scaled sum of the binary pixels of the selector plane contributing to the gray-value pixel. (Col. 15, lines 3-7). The pixels of the decompressed image are computed as "a weighted average of the foreground and background values

corresponding to the gray-valued pixel." (Col. 15, lines 9-12). In this embodiment, the gray-valued pixel is used to weight the sum of the foreground and background pixels.

This embodiment of MacLeod et al. performs a weighted average between corresponding pixels of the foreground and background plane in order to produce the output image. This weighted average is computed for every pixel of the output image. As stated by MacLeod et al. in Step 2511 of Figure 25b, "for each output pixel compute output pixel as weighted average of foreground and background pixel value." (Emphasis Added). Since every pixel of the output image is a weighted average of foreground and background pixels, every output pixel in the decompressed image is an arithmetic combination of the foreground and background pixels. Because every pixel in this embodiment is an arithmetic combination of the foreground and background pixels, there is no selection between pixels of a single plane and an arithmetic operation of pixels from more than one of said plural planes.

Thus, MacLeod et al. discloses two alternate embodiments. In one embodiment, MacLeod et al. discloses selecting an output pixel from either a foreground plane or a background plane, but does not disclose an arithmetic operation of pixels from more than one plane. In the alternate embodiment of MacLeod et al. used for low resolutions, every output pixel is computed via a weighted average of pixels from the foreground and background plane and there is no selection of pixel values solely from a single plane. There is no single embodiment in MacLeod et al. which teaches both "selecting pixels of the image" and "an arithmetic operation of pixels from more than one than one of said plural planes," as required by the presently pending claims.

The Present Invention Distinguished

The Applicants' invention is directed towards an improvement of prior image reconstruction models. In an embodiment, "information from an upper plane is first (prior to making the selection) added to the content of a lower plane." (p.15, lines 9-12). As illustrated in Applicants' Figure 3a, the binary selector plane is used to select data from either the lower plane or the sum of the lower plane and the upper plane. In comparison with prior reconstruction models, as illustrated by Figure 2, this embodiment includes the introduction of an adder, which provides a mechanism to correct for representation errors resulting from classification adjustments (p.15, lines 12-18).

Thus, in one aspect, the selector plane selects, for each output pixel, data from either a single plane or from an arithmetic operation of pixels from several planes. Independent claims 30, 36, and 43 all recite similar limitations. Because the cited art does not disclose all of the limitations of the Applicants' claims, the Applicants assert that the claims are patentable over the prior art.

Further, Applicant respectfully submits that MacLead teaches away from combining the elements of "selecting pixels of the image" and "an arithmetic operation of pixels from more than one than one of said plural planes," according to the invention of Claims 15, 30, 36, and 43.

In the first embodiment of *MacLeod et al.*, as discussed above, the selector plane chooses between either the foreground and background images (Col. 14, lines 61-63). In this embodiment, the selector plane is stored as a bitmap, a binary pixel map in which pixels can take one of two values, 1 or 0 (Col. 4, lines 18-19 and lines 8-10). For each pixel in the selector plane, a logical zero value means the pixel value should be taken from the background plane, while a logical one value means that the pixel should be taken from the foreground plane (Col. 4, lines 45-54).

In the second embodiment, which is used for low resolution displays, *MacLeod et al.* uses a gray-valued pixel map, in which pixels may have more than 2 values (Col. 15, lines 9-12). A scale-to-gray operation is performed to create the gray-value pixel map (Col. 15, lines 3-5). In this embodiment, the non-binary gray-valued pixel is used to compute the output pixel as a weighted average of the pixels of the foreground and background planes (Col. 15, lines 9-12).

Because the first embodiment employs a binary-valued pixel for "selecting pixels of the image" and the second embodiment employs a gray-valued pixel for "an arithmetic operation of pixels from more than one than one of said plural planes," it would be impossible to combine these elements as described by the separate embodiments of *MacLeod et al.* in order to produce the invention of Claims 15, 30, 36, and 43. For the first element of "selecting pixels of the image," a binary value is used to select between the foreground and background planes. Not only is there no teaching or suggestion in *MacLeod et al.* for using a non-binary value to perform this selection, but there is nothing in *MacLeod et al.* to suggest how a non-binary value could be used to select between two image planes. Examine states on page 4, line 5, of the office action, that "the foreground and background pixels must be selected from one of the planes in order to do the arithmetic operation". Applicant respectfully submits that in the low resolution embodiment that the Examiner refers to, each of the foreground and background pixels must be selected from both planes to generate a weighted average.

Similarly, for the second element of "an arithmetic operation of pixels from more than one than one of said plural planes," the second embodiment of *MacLeod et al.* uses the non-binary gray valued pixel as the weight in computing the weighted average of the pixels of the foreground and background planes. There no teaching or suggestion in *MacLeod et al.* for using a binary value to perform a weighted average

computation; moreover, there is nothing to suggest how a binary value could be used to perform a "weighted average."

Furthermore, Claims 17-20, 31-33, 37-38, and 45-47 are patentable over *MacLeod et al.* for at least their dependence on independently allowable claims.

Applicant further submits that MacLeod et al. does not render the invention as defined in Claims 15, 30, 36, and 43 obvious to one of average skill in the art because there is nothing in the art which teaches, explicitly or implicitly, the modification of the reference. Specifically, there is no motivation in the art or in MacLeod et al. to combine the separate embodiments of MacLeod et al. in order to disclose the inventions of Claims 15, 30, 36, and 43.

RESPONSE TO REJECTIONS UNDER 35 USC §103

The Claimed Invention Distinguishes Over the Combination of Macleod et al. and O'Mahony

The Examiner rejected claim 33 under 35 USC §103(a) as being unpatentable over Macleod et al. in view of WO 94/06111 ("O'Mahony"). Applicants respectfully traverse the rejection based on the combination of Macleod et al. and O'Mahony.

O'Mahony discloses a CRT control system that controls the degree of mixing index color signals with corresponding video color-intensity signals for the pixels in a CRT (page 5, first paragraph). O'Mahony does not teach or suggest "wherein said value of said selector plane is based on at least one of super-resolution and fine edge detail in corresponding locations of said image" as claimed in claim 33, or anything regarding compression of digital images. Further, Macleod et al. does not disclose the elements

as claimed in claim 33. For this reason, Applicant submits that the invention as claimed in claim 33 is distinguishable from the cited prior art.

Applicant further submits that claim 33 is allowable as being indirectly dependent upon allowable claim 30.

Furthermore, there is nothing in *O'Mahony* or *MacLeod et al.* to teach or suggest, either implicitly or explicitly, the combination of the references. Applicants respectfully disagree with the Examiner's assertion that the teachings of O'Mahony, which pertain to a "color CRT display apparatus wherein digital color signals are converted to analog format for controlling the electron beam guns of the CRT," are analogous to each other. O'Mahony relates to controlling a CRT screen, while MacLeod relates to compressing and decompressing images, two different and distinct fields.

ADVISORY ACTION REQUESTED

With the present response, Applicant has responded to the final office action within two months of the mailing date of the action, and respectfully requests an advisory action.

CONCLUSION

In light of the above, it is respectfully submitted that all of the claims now pending in the subject patent application should be allowable, and a Notice of Allowance is requested. The Examiner is respectfully requested to telephone the undersigned if he can assist in any way in expediting issuance of a patent.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 06-1325 for any matter in connection with this response, including any fee for extension of time, which may be required.

Respectfully submitted,

Date: 6/18/02

By: _____
Stephen R. Bachmann
Reg. No. 50,806

FLIESLER DUBB MEYER & LOVEJOY LLP
Four Embarcadero Center, Fourth Floor
San Francisco, California 94111-4156
Telephone: (415) 362-3800